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a layer which is provided under the packed bed and above the liquid inlet and which is configured to disperse an upward stream of the waste water introduced through the liquid inlet into the container, the layer having a plurality of rigid metal particles.

45. (New) A wet-oxidation treatment apparatus according to claim 43, further comprising:

a layer which is provided under the packed bed and above the liquid inlet and which is configured to disperse an upward stream of the waste water introduced through the liquid inlet into the container, the layer having a plurality of rigid metal particles.

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#### **REMARKS**

Favorable reconsideration of this application, as presently amended, is respectfully requested.

Claims 6-10, 14, 15, 19 and 39-45 are now active in this application, Claims 6, 10, 14 and 15 having been amended and Claims 43-45 having been added by the present amendment.

In the outstanding Office Action, Claim 14 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite; Claims 6, 7, 10, 14, 15 and 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over WO 96/13463 in view of Gentry (U.S. Patent 5,601,797); and Claims 8, 9 and 39-42 were rejected under 35 U.S.C. 103(a) as being unpatentable over WO 96/13463 and Gentry as applied above, further in view of published European Patent Application No. 0 636 399.

The personal interview granted by Examiner Cintins, on April 28, 2003, is hereby gratefully acknowledged. In the course of this interview, the essential aspect of Claims 6 and

15 was briefly summarized and Gentry was discussed as was the rejection of the claims. The Examiner indicated that he would reconsider and further search if necessary.

In response to the rejection under 35 U.S.C. §112, second paragraph, Claim 14 has been amended to depend from Claim 6. Therefore, Claim 14 is now believed to be in full compliance with the requirements of 35 U.S.C. §112, second paragraph. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work in a joint effort to derive mutually agreeable claim language.

Claims 6, 10, 14, 15 and 43-45 are fully supported by the specification, drawings and claims as originally filed. Applicants therefore submit that no new matter has been introduced.

Briefly recapitulating, Claim 6 is directed to a wet-oxidation treatment apparatus for treating waste water. For example, referring to the non-limiting embodiment of Fig. 1, the apparatus includes a liquid inlet, a liquid outlet, a packed bed 18 of a solid catalyst and/or a solid adsorbent, and a water-permeable pressure layer 17. The packed bed 18 is provided in the apparatus. The liquid inlet is provided in the apparatus below the packed bed 18 and connected to a source of the waste water. The liquid outlet is provided in the apparatus above the packed bed 18. Treated waste water is discharged from the apparatus through the liquid outlet. The water-permeable pressure layer 17 is provided on an upper surface of the packed bed 18 and has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent. The water-permeable pressure layer 17 is deformable according to a deformation of the upper surface of the packed bed 18. The water-permeable pressure layer 17 is a substance having a plurality of rigid metal particles selected from the group consisting of stainless steel, titanium and zirconium.

In a wet-oxidation treatment apparatus, the waste water supplied to the apparatus through the liquid inlet flows upwardly in the packed bed. If the pressure layer is not provided on the upper surface of the packed bed, the solid catalyst moves and vibrates in the packed bed due to the upward flow of the waste water. Consequently, rapid abrasion of the solid catalyst occurs. Accordingly, a pressure layer is provided on the upper surface of the packed bed to suppress the abrasion of the solid catalyst. However, even though the pressure layer is provided, the solid catalyst is gradually abraded to reduce its volume while the apparatus is used. As a result, a gap is created between the upper surface of the packed bed and the pressure layer (see Fig. 9) and rapid abrasion of the solid catalyst occurs.

In the wet-oxidation treatment apparatus recited in Claim 6, the water-permeable pressure layer 17 has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent and the water-permeable pressure layer 17 is deformable according to a deformation of the upper surface of the packed bed 18 (for example, see Fig. 7). Therefore, the abrasion of the solid catalyst may be suppressed even though the apparatus is used for a long time.

The Office Action asserts that Gentry discloses a catalytic unit of the type recited in claims.<sup>1</sup> However, Gentry fails to disclose that the water-permeable pressure layer has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent. Gentry, referring to Fig. 2, discloses a vapor/liquid contact tower, which is different from a wet-oxidation treatment apparatus. In the Gentry apparatus, the waste water is supplied to the top portion of the apparatus and discharged from the bottom portion of the apparatus (see Figs. 1-5). Accordingly, the waste water flows downwardly in the catalyst 102 by the gravity. Namely, the waste water gradually permeates the catalyst 102. Therefore, the solid catalyst

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<sup>1</sup>The Office Action, page 2, lines 3-2 from the bottom.

particles do not move and vibrate in the packed bed by the downward flow of the waste water. As a result, the Gentry apparatus does not require the water-permeable pressure layer which has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent.

As described above, in the Gentry apparatus, the abrasion of the solid catalyst by the flow of the waste water is not a problem, while this abrasion is the problem in the wet-oxidation treatment apparatus. Namely, in the Gentry reference, there is no disclosure how to suppress the abrasion of the solid catalyst caused by the flow of the waste water while the apparatus is used for a long time.

Gentry discloses small and large catalyst support media (104, 106) which are alumina balls.<sup>2</sup> However, Gentry does not disclose that a water-permeable pressure layer is a substance having a plurality of rigid metal particles selected from the group consisting of stainless steel, titanium and zirconium.

Neither WO 96/13463 nor Gentry teaches that a water-permeable pressure layer is a substance having a plurality of rigid metal particles selected from the group consisting of stainless steel, titanium and zirconium. Further, neither WO 96/13463 nor Gentry teaches that the water-permeable pressure layer has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent. Accordingly, even if the teachings of WO 96/13463 and Gentry are combined, the combined teachings of these references would not in any way obviate the invention recited in Claim 6.

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<sup>2</sup>Gentry, column 6, lines 11-15.

None of the applied references including the Gentry reference provides the motivation to modify the WO 96/13463 reference so as to arrive at Applicants' claimed invention.<sup>3</sup> In rejecting a claim under 35 U.S.C. §103(a), the USPTO must support its rejection by "substantial evidence" within the record.<sup>4</sup> There is no substantial evidence within the record of motivation for modifying the WO 96/13463 references so as to obtain Applicants' claimed invention. As described above, in the Gentry apparatus, the abrasion of the solid catalyst by the flow of the waste water is not a problem, and so the Gentry apparatus does not require the water-permeable pressure layer which has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent. Therefore, a person of ordinary skill in the art would not have been motivated and would not have found it obvious to perform such modification, and Claim 6 is believed to be non-obvious and patentable over the applied prior art. Consequently, Claim 6 is believed to be allowable.

Claim 15 is directed to a wet-oxidation treatment apparatus for treating waste water. For example, referring to the non-limiting embodiment of Fig. 1, the apparatus includes a liquid inlet, a liquid outlet, a packed bed 18 of a solid catalyst and/or the solid adsorbent, and a layer 23. The packed bed 18 is provided in the apparatus. The liquid inlet is provided in

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<sup>3</sup> See MPEP 2143.01 stating "[o]bviousness can only be established by combining or modifying the teaching of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art," (citations omitted). See also MPEP 2144.08 III stating that "[e]xplicit findings on motivation or suggestion to select the claimed invention should also be articulated in order to support a 35 U.S.C. 103 ground of rejection. . . . Conclusory statements of similarity or motivation, without any articulated rational or evidentiary support, do not constitute sufficient factual findings."

<sup>4</sup> In re Gartside, 203 F3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000) (holding that, consistent with the Administrative Procedure Act at 5 USC 706(e), the CAFC reviews the Board's decisions based on factfindings, such as 35 U.S.C. §103(a) rejections, using the 'substantial evidence' standard because these decisions are confined to the factual record compiled by the Board.)

the apparatus below the packed bed 18 and connected to a source of the waste water. The liquid outlet is provided in the apparatus above the packed bed 18. Treated waste water is discharged from the apparatus through the liquid outlet. The layer 23 is provided under the packed bed 18 and above the liquid inlet. The layer 23 is configured to disperse an upward stream of the waste water and/or a waste gas introduced through the liquid inlet into the apparatus. The layer 23 is a substance having a plurality of rigid metallic particles selected from the group consisting of stainless steel, titanium and zirconium.

In the wet-oxidation treatment apparatus, the waste water supplied to the apparatus through the liquid inlet flows upwardly in the packed bed. If the layer is not provided under the packed bed and above the liquid inlet, abrasion of the solid catalyst occurs because the upstream flow of the waste water directly hit the lower surface of the packed bed. As a result, a dent is created on the lower surface of the packed bed (see Fig. 15).

In the wet-oxidation treatment apparatus recited in Claim 15, the layer 23 is provided under the packed bed 18 and above the liquid inlet (for example, see Fig. 13). Therefore, since the layer 23 disperses an upward stream of the waste water, the abrasion of the solid catalyst may be suppressed even though the apparatus is used for a long time.

Gentry discloses small and large catalyst support media (104, 106) which are alumina balls.<sup>5</sup> However, Gentry does not disclose that a layer is a substance having a plurality of rigid metal particles selected from the group consisting of stainless steel, titanium and zirconium.

Neither WO 96/13463 nor Gentry teaches that a layer is a substance having a plurality of rigid metal particles selected from the group consisting of stainless steel, titanium and zirconium. Accordingly, even if the teachings of WO 96/13463 and Gentry are combined,

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<sup>5</sup>Gentry, column 6, lines 11-15.

the combined teachings of these references would not in any way obviate the invention recited in Claim 15.

Gentry, referring to Fig. 2, discloses a vapor/liquid contact tower, which is different from a wet-oxidation treatment apparatus. In the Gentry apparatus, the waste water is supplied to the top portion of the apparatus and discharged from the bottom portion of the apparatus (see Figs. 1-5). Accordingly, the waste water flows downwardly in the catalyst 102 by the gravity. Namely, the waste water gradually permeates the catalyst 102. Therefore, the solid catalyst particles do not move and vibrate in the packed bed by the flow of the waste water. Thus, abrasion of the solid catalyst does not occur due to the flow of the waste water and, as a result, a dent is not created on the upper surface of the catalyst 102. Hence, the Gentry apparatus does not require the layer which is configured to disperse an upward stream of the waste water and/or a waste gas introduced through the liquid inlet into the apparatus.

Accordingly, none of the applied references including the Gentry reference provides the motivation to modify the WO 96/13463 reference so as to arrive at Applicants' claimed invention. Therefore, a person of ordinary skill in the art would not have been motivated and would not have found it obvious to perform such modification, and Claim 15 is believed to be non-obvious and patentable over the applied prior art. Consequently, Claim 15 is believed to be allowable.

Claim 43 is directed to a wet-oxidation treatment apparatus for treating waste water. For example, referring to the non-limiting embodiment of Fig. 1, the apparatus includes a container, a liquid inlet, a liquid outlet, a packed bed 18 of a solid catalyst and/or the solid adsorbent, and a water-permeable pressure layer 17. The packed bed 18 is provided in the container. The liquid inlet is provided in the container below the packed bed 18 and

connected to a source of the waste water. The liquid outlet is provided in the container above the packed bed 18. Treated waste water is discharged from the container through the liquid outlet. The water-permeable pressing layer 18 is provided on an upper surface of the packed bed 18 and has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent. The water-permeable pressing layer is deformable according to a deformation of the upper surface of the packed bed and has a plurality of rigid metal particles.

In the wet-oxidation treatment apparatus recited in Claim 43, the water-permeable pressure layer 17 has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent and the water-permeable pressure layer 17 is deformable according to a deformation of the upper surface of the packed bed 18 (for example, see Fig. 7). Therefore, the abrasion of the solid catalyst may be suppressed even though the apparatus is used for a long time.

Neither WO 96/13463 nor Gentry teaches that a water-permeable pressure layer is a substance having a plurality of rigid metal particles and that the water-permeable pressure layer has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent. Accordingly, even if the teachings of WO 96/13463 and Gentry are combined, the combined teachings of these references would not in any way obviate the invention recited in Claim 43.

None of the applied references including the Gentry reference provides the motivation to modify the WO 96/13463 reference so as to arrive at Applicants' claimed invention. As described above, in the Gentry apparatus, the abrasion of the solid catalyst by the flow of the waste water is not a problem, and so the Gentry apparatus does not require the water-permeable pressure layer which has a load enough to suppress a movement of the solid catalyst and/or the solid adsorbent. Therefore, a person of ordinary skill in the art would not



have been motivated and would not have found it obvious to perform such modification, and Claim 43 is believed to be non-obvious and patentable over the applied prior art. Consequently, Claim 43 is believed to be allowable.

Substantially the same arguments as set forth above with regard to Claim 43 also apply to dependent Claim 45. Accordingly, Claim 45 is also believed to be allowable.

Claim 44 is directed to a wet-oxidation treatment apparatus for treating waste water. For example, referring to the non-limiting embodiment of Fig. 1, the apparatus includes a container, a liquid inlet, a liquid outlet, a packed bed 18 of a solid catalyst and/or the solid adsorbent, and a layer 23. The packed bed 18 is provided in the container. The liquid inlet is provided in the container below the packed bed 18 and connected to a source of the waste water. The liquid outlet is provided in the container above the packed bed 18. Treated waste water is discharged from the container through the liquid outlet. The layer 23 is provided under the packed bed 18 and above the liquid inlet and is configured to disperse an upward stream of the waste water introduced through the liquid inlet into the container. The layer has a plurality of rigid metal particles.

In the wet-oxidation treatment apparatus recited in Claim 44, the layer 23 is provided under the packed bed 18 and above the liquid inlet (for example, see Fig. 13). Therefore, since the layer 23 disperses an upward stream of the waste water, the abrasion of the solid catalyst may be suppressed even though the apparatus is used for a long time.

Neither WO 96/13463 nor Gentry teaches that a layer is a substance having a plurality of rigid metal particles. Accordingly, even if the teachings of WO 96/13463 and Gentry are combined, the combined teachings of these references would not in any way obviate the invention recited in Claim 44.

None of the applied references including the Gentry reference provides the motivation to modify the WO 96/13463 reference so as to arrive at Applicants' claimed invention.

Therefore, a person of ordinary skill in the art would not have been motivated and would not have found it obvious to perform such modification, and Claim 44 is believed to be non-obvious and patentable over the applied prior art. Consequently, Claim 44 is believed to be allowable.

Substantially the same arguments as set forth above with regard to Claim 6 also apply to dependent Claims 7-10, 14, 19 and 39-42. Accordingly, each dependent claim is also believed to be allowable.

Consequently, in view of the present amendment, it is respectfully submitted that this application is in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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**IN THE CLAIMS**

Please amend Claims 6, 10, 14 and 15 as follows:

6. (Seven Times Amended) A wet-oxidation treatment apparatus for [An apparatus for preventing abrasion of a solid catalyst and/or a solid adsorbent while] treating waste water, comprising:

a packed bed of [the] a solid catalyst and/or [the] a solid adsorbent provided in the apparatus; [and]

a liquid inlet provided in the apparatus below the packed bed and connected to a source of the waste water;

a liquid outlet which is provided in the apparatus above the packed bed and through which treated waste water is discharged from the apparatus; and

a water-permeable pressure layer provided on an upper surface of the packed bed and having a load [which can suppress] enough to suppress a movement of the solid catalyst and/or the solid adsorbent, the water-permeable pressure layer being deformable according to a deformation of the upper surface of the packed bed, [of the solid catalyst and/or the solid adsorbent;

wherein the packed bed is provided in a wet-oxidation treatment unit;

wherein the water-permeable pressure layer is provided on the packed bed of the solid catalyst and/or the solid adsorbent;]

wherein the water-permeable pressure layer is a substance having a plurality of rigid metal particles [or ceramic particles; and

wherein the rigid metal particles are one of] selected from the group consisting of stainless steel, titanium and zirconium.

10. (Five Times Amended) An apparatus according to claim 6, further comprising:  
a layer provided under the packed bed and above the liquid inlet and configured to disperse [and mitigate] an upward stream of the waste water and/or a waste gas introduced through the liquid inlet into the apparatus[, said layer being provided under the packed bed; wherein the packed bed is provided in a wet-oxidation treatment unit].

14. (Twice Amended) The apparatus according to claim 6 [13], wherein each rigid metallic [or ceramic particle] has an average diameter of 3 to 30 mm.

15. (Six Times Amended) A wet-oxidation treatment apparatus for [An apparatus for preventing abrasion of a solid catalyst and/or a solid adsorbent while] treating waste water, comprising:

a packed bed of [the] a solid catalyst and/or [the] a solid adsorbent provided in the apparatus; [and]

a liquid inlet provided in the apparatus below the packed bed and connected to a source of the waste water;

a liquid outlet which is provided in the apparatus above the packed bed and through which treated waste water is discharged from the apparatus; and

a layer provided under the packed bed and above the liquid inlet and configured to disperse [and mitigate] an upward stream of the waste water and/or a waste gas introduced through the liquid inlet into the apparatus.[;]

[wherein the packed bed is provided in a wet-oxidation treatment unit;

wherein the dispersing and mitigating layer is provided under the packed bed of the solid catalyst and/or the solid adsorbent;]

wherein the [dispersing and mitigating] layer is a substance having a plurality of rigid metallic particles [or ceramic particles; and

wherein the rigid metallic particles are one of] selected from the group consisting of stainless steel, titanium and zirconium.

Please add new Claims 43-45 as follows:

43-45. (New)--